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Low Impact Development in Puget Sound

Sound WAVES

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HELPING TO PROTECT OUR WATERS AS WE GROW

By Bruce Wulkan, Stormwater Program lead

What is Low Impact Development?

Low impact development, or LID, is a natural approach to land development and stormwater management designed to reduce impacts on watershed hydrology and aquatic resources. (Watershed hydrology is the relationship between rainfall, evaporation, groundwater infiltration and flow of surface water.)

LID is based on the premise that nature knows best. Forests and other natural areas are extremely effective stormwater management systems. For example, there is very little runoff in a forested area—most rainfall infiltrates to the ground, is taken up by vegetation, or evaporates to the atmosphere. So rather than collecting and conveying stormwater off site through pipes and other conveyance systems, LID-designed sites use vegetation and small-scale hydrologic controls to capture, treat and infiltrate stormwater on site. This helps maintain the natural hydrology as it undergoes development.

To design using LID, a developer maps the site's natural runoff patterns and sets aside all sensitive areas and natural drainages, such as streams and wetlands. A portion of the site's trees and other native vegetation is also set aside. The remainder of the site is the development envelope. Specially designed landscaped areas (called bioretention cells, or rain gardens) capture, filter and infiltrate stormwater. Developers design narrower roads and use permeable pavement for parking lots, driveways and other impervious surfaces. Runoff is directed from remaining impervious surfaces—such as rooftops—onto vegetated areas with porous soils. Rooftop design can also include roof gardens, which further retain and slowly release stormwater. Soils compacted during construction are amended with compost or other organic material to restore their capacity to infiltrate runoff and grow healthy plants.

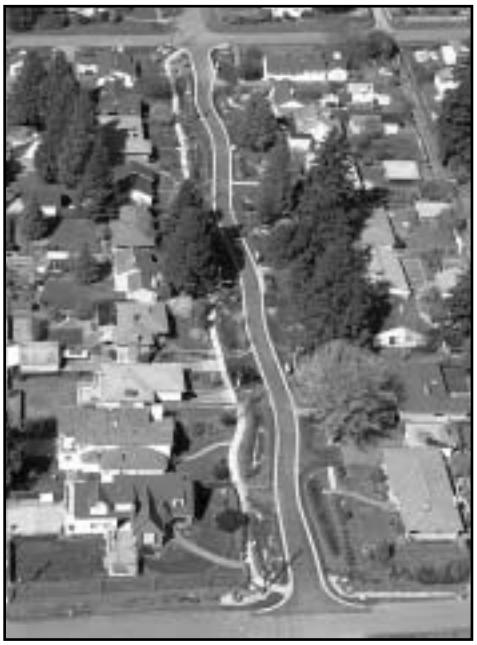

Photo courtesy of Seattle Public Utilities

Growing greener and protecting area streams. The Street Edge Alternatives Project on 2nd Avenue NW in Seattle.

When combined with effective local land use planning and watershed or basin planning, LID can help protect watershed hydrology and aquatic resources as we grow. (Note: Because infiltration rates vary among development sites, depending on soils, topography and other factors, each site should be assessed to determine which LID practices are most appropriate. Given the wide range of practices available, every site should include at least a few of the practices.)

▶ Why is LID important?

Studies show that our efforts to mitigate the effects of development through traditional stormwater management practices have not proven entirely successful. Collection and conveyance systems, stormwater ponds and other traditional stormwater facilities do not replicate natural systems, which greatly slow water before it reaches streams, wetlands and other waters. The loss of trees and other vegetation, the compaction of soils by heavy equipment, the creation of vast stretches of connected impervious areas—all these factors combined are extremely difficult to compensate for using traditional practices.

The result? Stormwater runoff has significantly degraded many streams in Puget Sound. Habitat loss is documented as one of the factors limiting our ability to recover salmon under the Endangered Species Act. A multi-year study in King County showed that amphibians and birds in wetlands are threatened more by excessive fluctuations in water levels (due

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To learn more about low impact development, stormwater, smart growth and other issues pertaining to sound development, visit the Action Team's website at: **http://www.wa.gov/puget_sound**. You can also contact Bruce Wulkan, the Action Team's technical and policy specialist on stormwater, at (360) 407-7332 or bwulkan@psat.wa.gov.

Protecting our waters

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to stormwater) than by water pollution. Stormwater alters the hydrology of Puget Sound's watersheds, which affects our region's streams and wetlands (and potentially our drinking water supplies).

▶ Other benefits of LID

In addition to better protecting the environment, low impact development also provides economic and community benefits. Developers using LID practices potentially increase developable land by reducing size requirements for stormwater ponds. Reduced stormwater drainage facilities can result in lower infrastructure costs. And stormwater utility fees may be lower due to the reduced amount of impervious areas.

Local governments and communities benefit by better protecting streams and habitat for endangered salmon, shellfish growing areas, and other natural resources. As neighborhoods, homes and businesses grow greener, they become more attractive and property values can increase. Stormwater facilities can be easier to oversee and less costly to maintain. Drinking water supplies can be better maintained. And low impact development provides new tools for cost-effective retrofit as well—something that concerns many communities.

▶ LID projects in Puget Sound

There are now numerous LID ordinances and projects in the Puget Sound region. The Puget Sound Action Team compiled 33 local projects and ordinances in Natural Approaches to Stormwater Management: Low Impact Development in Puget Sound. To view the publication on-line, visit: http://www.wa.gov/puget_sound/. For the print version, call Gigi Williams at (360) 407-7311.

Limitations of LID and the importance of effective local land-use planning

Low impact development practices alone cannot fully protect our water quality and biological resources. Local land use planning and comprehensive stormwater management are just as important. First we must choose where to grow and where to protect. Then we can use LID practices, and other key elements of a comprehensive program, to manage runoff and lessen our impact on Puget Sound. To be most effective, local land use planning should include:

- Designating urban growth areas with appropriate densities and capital facilities to reduce sprawl.
- Providing adequate vegetative buffers and development setbacks in critical areas ordinances to protect sensitive areas.
- Assessing how full build-out according to the comprehensive plan will alter aquatic resources.
- Using measures to protect natural hydrology and processes, such as setting goals for limiting impervious surfaces and preserving forests and other open spaces.

Comprehensive stormwater management should include appropriate LID practices in all new development and retrofit projects, inspections of construction sites, maintenance of temporary and permanent facilities, source control, elimination of illicit discharges, attention to existing problems, public education and involvement, watershed or basin planning, stable funding, and periodic monitoring to evaluate program effectiveness.

~ Stormwater and Combined Sewer Overflows Program, *Puget Sound Water Quality Management Plan*

ECOLOGY STORMWATER MANUAL PROMOTES LID

By Ed O'Brien
Department of Ecology

The Washington State Department of Ecology's ***Stormwater Management Manual for Western Washington*** offers a guide for communities and businesses in western Washington to meet federal and state requirements. The new manual uses technically current information to provide better protection of water resources.

For more information on the manual, visit Ecology's Stormwater Web site: **http://www.ecy.wa.gov/programs/wq/stormwater**

The new manual promotes low impact development (LID) techniques in several ways:

▶ New flow control standard is a disincentive to standard development practice. Depending upon the soil conditions and whether the site historically was forested or prairie, a detention pond to serve a standard residential development of four homes per acre can be from 1.4 to 4 times larger than required by the old standard. That translates into loss of building lots if the developer uses standard development practices.

▶ Size thresholds and drainage analysis procedures encourage reduction in impervious surfaces and landscaped areas. The manual will include a new set of size thresholds and use of a new drainage analysis procedure for determining whether construction of engineered structures for flow control and treatment are necessary. The approach should encourage retention of natural drainage features. It will allow even the largest projects to apply simple, lower cost on-site best management practices to manage stormwater from small areas of the project that have their own natural drainage away from the project site.

▶ Hydrologic modeling program has incentives to encourage LID. To comply with the new flow control standard requires the use of continuous simulation runoff modeling. Knowing that we need the aggressive application of LID techniques to protect western Washington streams, the model gives credit for using certain types of LID techniques. Ecology hopes that more developers will use LID techniques when they see how much smaller their detention ponds can be.

LID techniques that reduce the size of flow control facilities include:

- Undisturbed and protected natural vegetation and soil topography and profile.
- Reduced road widths and lengths, smaller driveways, and homes with smaller footprints.
- Roof runoff infiltration or dispersion through > 50 feet of vegetation.
- Use of porous pavers and permeable interlocking concrete.

For residential developments preserving 65 percent of a site in forest and having less than 10 percent impervious area, whose runoff is routed into that forest, no flow control is necessary.

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